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**CCGPS**

**Curriculum Map**

**Mathematics**



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Common Core Georgia Performance Standards

High School Mathematics

**Accelerated CCGPS Coordinate Algebra/Analytic Geometry A – At a Glance**

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| Common Core Georgia Performance Standards: Curriculum Map | | | | | | | | | |
| 1st Semester | | | | | 2nd Semester | | | | |
|  |  |  |  |  | |  |  |  |  |
| Unit 1  ***(3 – 4 weeks)*** | Unit 2  ***(3 – 4 weeks)*** | Unit 3  ***(5 – 6 weeks)*** | Unit 4  ***(3 – 4 weeks)*** | Unit 5  ***(3 – 4 weeks)*** | | Unit 6  ***(3 – 4 weeks)*** | Unit 7  ***(5 – 6 weeks)*** | Unit 8  ***(2 – 3 weeks)*** | Unit 9  ***(3 – 4 weeks)*** |
| **Relationships Between Quantities** | **Reasoning with Equations and Inequalities** | **Linear and Exponential Functions** | **Describing Data** | **Transfor-mations in the Coordinate Plane** | | **Connecting Algebra and Geometry Through Coordinates** | **Similarity, Congruence, and Proofs** | **Right Triangle Trigonometry** | **Circles and Volume** |
| **MCC9-12.N.Q.1**  **MCC9-12.N.Q.2**  **MCC9-12.N.Q.3**  **MCC9-12.A.SSE.1a,b**  **MCC9-12.A.CED.1**  **MCC9-12.A.CED.2**  **MCC9-12.A.CED.3**  **MCC9-12.A.CED.4** | **MCC9-12.A.REI.1**  **MCC9-12.A.REI.3**  **MCC9-12.A.REI.5**  **MCC9-12.A.REI.6**  **MCC9-12.A.REI.12** | **MCC9-12.A.REI.10**  **MCC9-12.A.REI.11**  **MCC9-12.F.IF.1**  **MCC9-12.F.IF.2**  **MCC9-12.F.IF.3**  **MCC9-12.F.IF.4**  **MCC9-12.F.IF.5**  **MCC9-12.F.IF.6**  **MCC9-12.F.IF.7a,e**  **MCC9-12.F.IF.9**  **MCC9-12.F.BF.1a,b**  **MCC9-12.F.BF.2**  **MCC9-12.F.BF.3**  **MCC9-12.F.LE.1a,b,c**  **MCC9-12.F.LE.2**  **MCC9-12.F.LE.3**  **MCC9-12.F.LE.5** | **MCC9-12.S.ID.1**  **MCC9-12.S.ID.2**  **MCC9-12.S.ID.3**  **MCC9-12.S.ID.5**  **MCC9-12.S.ID.6a,b,c**  **MCC9-12.S.ID.7**  **MCC9-12.S.ID.8**  **MCC9-12.S.ID.9** | **MCC9-12.G.CO.1**  **MCC9-12.G.CO.2**  **MCC9-12.G.CO.3**  **MCC9-12.G.CO.4**  **MCC9-12.G.CO.5** | | **MCC9-12.G.GPE.4**  **MCC9-12.G.GPE.5**  **MCC9-12.G.GPE.6**  **MCC9-12.G.GPE.7** | **MCC9-12.G.SRT.1**  **MCC9-12.G.SRT.2**  **MCC9-12.G.SRT.3**  **MCC9-12.G.SRT.4**  **MCC9-12.G.SRT.5**  **MCC9-12.G.CO.6**  **MCC9-12.G.CO.7**  **MCC9-12.G.CO.8**  **MCC9-12.G.CO.9**  **MCC9-12.G.CO.10**  **MCC9-12.G.CO.11**  **MCC9-12.G.CO.12**  **MCC9-12.G.CO.13**  **MCC9-12.G.GPE.4** | **MCC9-12.G.SRT.6**  **MCC9-12.G.SRT.7**  **MCC9-12.G.SRT.8** | **MCC9-12.G.C.1**  **MCC9-12.G.C.2**  **MCC9-12.G.C.3**  **MCC9-12.G.C.4(+)**  **MCC9-12.G.C.5**  **MCC9-12.G.GMD.1**  **MCC9-12.G.GMD.2(+)**  **MCC9-12.G.GMD.3** |
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| These units were written to build upon concepts from prior units, so later units contain tasks that depend upon the concepts addressed in earlier units.  All units will include the Mathematical Practices and indicate skills to maintain. | | | | | | | | | |

**NOTE:** Mathematical standards are interwoven and should be addressed throughout the year in as many different units and tasks as possible in order to stress the natural connections that exist among mathematical topics.

**Grade 9-12 Key:**

**Number and Quantity Strand:** RN = The Real Number System, Q = Quantities, CN = Complex Number System, VM = Vector and Matrix Quantities

**Algebra Strand**: SSE = Seeing Structure in Expressions, APR = Arithmetic with Polynomial and Rational Expressions, CED = Creating Equations, REI = Reasoning with Equations and Inequalities

**Functions Strand**: IF = Interpreting Functions, LE = Linear and Exponential Models, BF = Building Functions, TF = Trigonometric Functions

**Geometry Strand:** CO = Congruence, SRT = Similarity, Right Triangles, and Trigonometry, C = Circles, GPE = Expressing Geometric Properties with Equations, GMD = Geometric Measurement and Dimension,MG = Modeling with Geometry

**Statistics and Probability Strand:** ID = Interpreting Categorical and Quantitative Data, IC = Making Inferences and Justifying Conclusions, CP = Conditional Probability and the Rules of Probability, MD = Using Probability to Make Decisions

Specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

**Common Core Georgia Performance Standards**

**Accelerated CCGPS Coordinate Algebra/Analytic Geometry A – 1st Semester**

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| Common Core Georgia Performance Standards: Curriculum Map | | | | | |
| **Standards for Mathematical Practice** | | | | | |
| **1** Make sense of problems and persevere in solving them.  **2** Reason abstractly and quantitatively.  **3** Construct viable arguments and critique the reasoning of others.  **4** Model with mathematics. | | | **5** Use appropriate tools strategically.  **6** Attend to precision.  **7** Look for and make use of structure.  **8** Look for and express regularity in repeated reasoning. | | |
| **1st Semester** | | | | | |
|  |  |  | |  |  |
| Unit 1 | Unit 2 | Unit 3 | | Unit 4 | Unit 5 |
| **Relationships Between Quantities** | **Reasoning with Equations and Inequalities** | **Linear and Exponential Functions** | | **Describing Data** | **Transformations in the Coordinate Plane** |
| **Reason quantitatively and use units to solve problems.**  **MCC9-12.N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.★  **MCC9-12.N.Q.2** Define appropriate quantities for the purpose of descriptive modeling.★  **MCC9-12.N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★  **Interpret the structure of expressions**  **MCC9-12.A.SSE.1** Interpret expressions that represent a quantity in terms of its context.★ *(Emphasis on linear expressions and exponential expressions with integer exponents.)*  **MCC9-12.A.SSE.1a** Interpret parts of an expression, such as terms, factors, and coefficients.★ *(Emphasis on linear expressions and exponential expressions with integer exponents.)*  **MCC9-12.A.SSE.1b** Interpret complicated expressions by viewing one or more of their parts as a single entity.★ *(Emphasis on linear expressions and exponential expressions with integer exponents.)*  **Create equations that describe numbers or relationships**  **MCC9-12.A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear ~~and quadratic functions, and simple rational~~ and exponential functions.★  **MCC9-12.A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★ *(Limit to linear and exponential equations, and, in the case of exponential equations, limit to situations requiring evaluation of exponential functions at integer inputs.)*  **MCC9-12.A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.★ *(Limit to linear equations and inequalities.)*  **MCC9-12.A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations*.*★ *(Limit to formulas with a linear focus.)* | **Understand solving equations as a process of reasoning and explain the reasoning**  **MCC9-12.A.REI.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. *(Students should focus on and master linear equations and be able to extend and apply their reasoning to other types of equations in future courses.)*  **Solve equations and inequalities in one variable**  **MCC9-12.A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. *(Extend earlier work with solving linear equations to solving linear inequalities in one variable and to solving literal equations that are linear in the variable being solved for. Include simple exponential equations that rely only on application of the laws of exponents, such as 5x = 125 or 2x = 1/16.)*  **Solve systems of equations**  **MCC9-12.A.REI.5** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. *(Limit to linear systems.)*  **MCC9-12.A.REI.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.  **Represent and solve equations and inequalities graphically**  **MCC9-12.A.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. | **Represent and solve equations and inequalities graphically**  **MCC9-12.A.REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). *(Focus on linear and exponential equations and be able to adapt and apply that learning to other types of equations in future courses.)*  **MCC9-12.A.REI.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, ~~polynomial, rational, absolute value~~, exponential, ~~and logarithmic~~ functions.★  **Understand the concept of a function and use function notation**  **MCC9-12.F.IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). *(Draw examples from linear and exponential functions.)*  **MCC9-12.F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. *(Draw examples from linear and exponential functions.)*  **MCC9-12.F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *(Draw connection to F.BF.2, which requires students to write arithmetic and geometric sequences.)*  **Interpret functions that arise in applications in terms of the context**  **MCC9-12.F.IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and ~~periodicity~~.★ *(Focus on linear and exponential functions.)*  **MCC9-12.F.IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.★ *(Focus on linear and exponential functions.)*  **MCC9-12.F.IF.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★ *(Focus on linear functions and intervals for exponential functions whose domain is a subset of the integers.)*  **Analyze functions using different representations**  **MCC9-12.F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ *(Focus on linear and exponential functions. Include comparisons of two functions presented algebraically.)*  **MCC9-12.F.IF.7a** Graph linear ~~and quadratic~~ functions and show intercepts, maxima, and minima.★  **MCC9-12.F.IF.7e** Graph exponential ~~and logarithmic~~ functions, showing intercepts and end behavior, ~~and trigonometric functions, showing period, midline, and amplitude~~.★  **MCC9-12.F.IF.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *(Focus on linear and exponential functions. Include comparisons of two functions presented algebraically.)*  **Build a function that models a relationship between two quantities**  **MCC9-12.F.BF.1** Write a function that describes a relationship between two quantities.★ *(Limit to linear and exponential functions.)*  **MCC9-12.F.BF.1a** Determine an explicit expression, a recursive process, or steps for calculation from a context. *(Limit to linear and exponential functions.)*  **MCC9-12.F.BF.1b** Combine standard function types using arithmetic operations. *(Limit to linear and exponential functions.)*  **MCC9-12.F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.★  **Build new functions from existing functions**  **MCC9-12.F.BF.3** Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. *(Focus on vertical translations of graphs of linear and exponential functions. Relate the vertical translation of a linear function to its y-intercept.)*  **Construct and compare linear, ~~quadratic~~, and exponential models and solve problems**  **MCC9-12.F.LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.★  **MCC9-12.F.LE.1a** Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.★  **MCC9-12.F.LE.1b** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.★  **MCC9-12.F.LE.1c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.★  **MCC9-12.F.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).★  **MCC9-12.F.LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, ~~quadratically, or (more generally) as a polynomial function~~.★  **Interpret expressions for functions in terms of the situation they model**  **MCC9-12.F.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.★ *(Limit exponential functions to those of the form f(x) = bx + k.)* | | **Summarize, represent, and interpret data on a single count or measurement variable**  **MCC9-12.S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).★  **MCC9-12.S.ID.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, ~~standard deviation~~) of two or more different data sets.★ *(Standard deviation is left for Advanced Algebra, use MAD as a measure of spread.)*  **MCC9-12.S.ID.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).★  **Summarize, represent, and interpret data on two categorical and quantitative variables**  **MCC9-12.S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.★  **MCC9-12.S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★  **MCC9-12.S.ID.6a** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, ~~quadratic~~, and exponential models.★  **MCC9-12.S.ID.6b** Informally assess the fit of a function by plotting and analyzing residuals.★  **MCC9-12.S.ID.6c** Fit a linear function for a scatter plot that suggests a linear association.★  **Interpret linear models**  **MCC9-12.S.ID.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.★  **MCC9-12.S.ID.8** Compute (using technology) and interpret the correlation coefficient of a linear fit.★  **MCC9-12.S.ID.9** Distinguish between correlation and causation.★ | **Experiment with transformations in the plane**  **MCC9-12.G.CO.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.  **MCC9-12.G.CO.2** Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).  **MCC9-12.G.CO.3** Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.  **MCC9-12.G.CO.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.  **MCC9-12.G.CO.5** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. |
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**Common Core Georgia Performance Standards**

**Accelerated CCGPS Coordinate Algebra/Analytic Geometry A – 2nd Semester**

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| Common Core Georgia Performance Standards: Curriculum Map | | | |
| **Standards for Mathematical Practice** | | | |
| **1** Make sense of problems and persevere in solving them.  **2** Reason abstractly and quantitatively.  **3** Construct viable arguments and critique the reasoning of others.  **4** Model with mathematics. | | **5** Use appropriate tools strategically.  **6** Attend to precision.  **7** Look for and make use of structure.  **8** Look for and express regularity in repeated reasoning. | |
| **2nd Semester** | | | |
|  |  |  |  |
| Unit 6 | Unit 7 | Unit 8 | Unit 9 |
| **Connecting Algebra and Geometry Through Coordinates** | **Similarity, Congruence, and Proofs** | **Right Triangle Trigonometry** | **Circles and Volume** |
| **Use coordinates to prove simple geometric theorems algebraically**  **MCC9-12.G.GPE.4** Use coordinates to prove simple geometric theorems algebraically.  **MCC9-12.G.GPE.5** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).  **MCC9-12.G.GPE.6** Find the point on a directed line segment between two given points that partitions the segment in a given ratio.  **MCC9-12.G.GPE.7** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★ | **Understand similarity in terms of similarity transformations**  **MCC9-12.G.SRT.1** Verify experimentally the properties of dilations given by a center and a scale factor:  **a**. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.  **b.** The dilation of a line segment is longer or shorter in the ratio given by the scale factor.  **MCC9-12.G.SRT.2** Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.  **MCC9-12.G.SRT.3** Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.  **Prove theorems involving similarity**  **MCC9-12.G.SRT.4** Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.  **MCC9-12.G.SRT.5** Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.  **Understand congruence in terms of rigid motions**  **MCC9-12.G.CO.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.  **MCC9-12.G.CO.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.  **MCC9-12.G.CO.8** Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.  **Prove geometric theorems**  **MCC9-12.G.CO.9** Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.  **MCC9-12.G.CO.10** Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.  **MCC9-12.G.CO.11** Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.  **Make geometric constructions**  **MCC9-12.G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.  **MCC9-12.G.CO.13** Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. **Use coordinates to prove simple geometric theorems algebraically**  **MCC9-12.G.GPE.4** Use coordinates to prove simple geometric theorems algebraically. | **Define trigonometric ratios and solve problems involving right triangles**  **MCC9-12.G.SRT.6** Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.  **MCC9-12.G.SRT.7** Explain and use the relationship between the sine and cosine of complementary angles.  **MCC9-12.G.SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. | **Understand and apply theorems about circles**  **MCC9-12.G.C.1** Prove that all circles are similar.  **MCC9-12.G.C.2** Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.  **MCC9-12.G.C.3** Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.  **MCC9-12.G.C.4 (+)** Construct a tangent line from a point outside a given circle to the circle.  **Find arc lengths and areas of sectors of circles**  **MCC9-12.G.C.5** Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.  **Explain volume formulas and use them to solve problems**  **MCC9-12.G.GMD.1** Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri’s principle, and informal limit arguments.  **MCC9-12.G.GMD.2 (+)** Give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures.  **MCC9-12.G.GMD.3** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★ |
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